

Library & Information Science Library
University of Toronto



3 1761 03240794 2

Normal library budget
and its units of expense

by

O. R. Howard Thomson

025.11
T484N

Library School
Emory University

Emory University, Ga.

~~CARNEGIE LIBRARY OF ATLANTA,
ATLANTA, GA.~~

LIBRARY HANDBOOK No. 9

A Normal Library Budget and its Units of Expense

BY

O. R. HOWARD THOMSON

Librarian, The James V. Brown Library
Williamsport, Pa.

Discarded

American Library Association Publishing Board
78 East Washington Street, Chicago

1913

~~LIBRARY TRAINING SCHOOL,
CARNEGIE LIBRARY OF ATLANTA,
ATLANTA, GA.~~

LIBRARY HANDBOOK No. 9

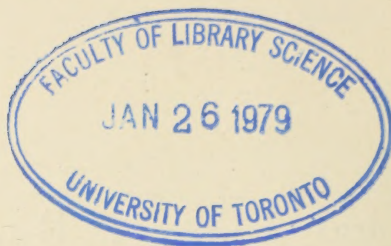
A Normal Library Budget and its Units of Expense

BY

O. R. HOWARD THOMSON

Librarian, The James V. Brown Library
Williamsport, Pa.

LIBRARY SCHOOL
AMERICAN LIBRARY ASSOCIATION PUBLISHING BOARD
78 East Washington Street, Chicago
1913



025.11
T484N

LIBRARY SCHOOL
EMORY UNIVERSITY
GEORGIA

A Normal Library Budget and Its Units of Expense¹

The feasibility of devising a system by which library budgets can be compiled has long been a moot question. This, not only because libraries are of different kinds and engaged in various sorts of work, but because of the present chaotic condition which is revealed by even a superficial study of the statistics available.

While schools have for years been compelled to furnish instruction to every child under a certain age in an assigned territory and given the money necessary to do so, libraries have been permitted to grow in a haphazard way, merely being expected to do the best possible with whatever income they have been able to secure. This income has borne no relation to the population which the library is presumably supposed to serve. Of cities of over 100,000 population, Chicago's per capita receipts in 1908, from taxes, were 12 cents; Philadelphia's, 15 cents; New York's, 23 cents; Pittsburgh's, 56 cents, and Seattle's, 61 cents; and the income of endowed libraries varied as greatly, the Rosenberg library, of Galveston, reporting an annual expenditure of 60 cents per capita and the James V. Brown library of Williamsport, an expenditure of 25 cents. With such differences in resources it is not surprising that the table, compiled four or five years ago by the Cleveland public library, of work done by the ten largest circulating libraries in the country should show an equal variation, the number of volumes loaned for home use varying from .92 per capita in Chicago to 3.99 in Cleveland. Nor, on account of the different work

1. From an address delivered before the Keystone State Library Association. All figures, unless otherwise credited, are from the U. S. Bureau of Education Bulletin, 1909; No. 5 (Whole No. 405).

undertaken by libraries, has the relationship between volumes circulated and money expended been more stable. In the list of 110 libraries circulating over 100,000 volumes annually, compiled by Dr. Bostwick, of St. Louis, in his "American public library,"¹ the expenditure per 100,000 volumes circulated varies from \$5,000 to \$25,000.

The Carnegie idea of an income equal to 10% of the cost of the building has been sufficiently advertised to necessitate mention. Even presuming the building to be adequate to the needs of the city, it is unscientific—being adequate or inadequate according to the cost of the materials of which the building is constructed. The Tacoma (Washington) library is erecting wooden branches, with shelving for 8,000 volumes, at a cost, including furniture and equipment, of \$5,000 each. That 10% of \$5,000, or \$500 a year, is insufficient to run a library of 8,000 volumes is so obvious that it should not require statement.

It is—from the standpoint of an observer of social conditions—the extraordinary absence of uniformity in library expenditure that makes it so difficult for most libraries to persuade the authorities to put them on a reasonable basis. In the matter of starting libraries anybody is privileged to do anything, and frequently the more inadequate the performance the greater the approbation expected. Recently, a library named after an individual was established in a city of almost 50,000 inhabitants, with an endowment of less than \$3,000 a year. Such things should be made by law as impossible as the establishment of a school system capable of instructing but 10% of the children.

The inadequacy of more than half of our public libraries is the cause of the slight esteem in which they are generally held by business men and taxpayers. If the business man, the mechanic, the seamstress, the cook, the bookkeeper, the engineer, the contractor and the

1. Published by Appleton & Co. 1910.

minister, find that despite the fact that their town or city has an ornate library building, they must still buy two-thirds of the books they themselves wish to consult, are they to be blamed for regarding the library as an institution devoted to the giving out of picture books to children and novels to women? Are they to be censured for regarding the library, not as an integral part of education, but as a luxury; a thing whose necessity, if greater than that of a village band, is less than that of cement-walks in the town green?

The lack of the recognition of a definite standard of work to be performed by a library, proportioned in amount to the population in which it is located, has made it difficult for libraries to secure from municipalities the funds they should receive. The statement that such and such a city spends such and such an amount is useless, because the library in the city quoted may be giving service far below that to which the city is entitled. At this day, the empirical method is, or should be, out of date, and a librarian should be able to state what a library adequate to any given city should cost; and to give a fairly accurate exposition of the necessity of the various units that make up the total.

As a hypothetical case, suppose a city council, of a city of 30,000 or 35,000 inhabitants, asked what a good, adequate, well-administered library should cost a year, and that after they were told \$10,000 or \$11,000, to \$12,000, they questioned the estimate, could it be demonstrated in an ordinary business way that the figures given were correct? I think it could, if they would bear in mind that the figures were for an ordinary circulating library, fairly well stocked when opened, and not expected to build up costly special collections; and if they would agree to the single premise that the home use of books should be at least three times the number of the population. There must be some standard of service on which to figure; and though reference work is quite as, if not more, important than circulation work, as the average town wants a circu-

lating library, circulation is the best basis on which to figure. This per capita figure of three is of necessity an arbitrary one, but nearly all libraries that are today accounted well administered come near it, while before the end of the present decade the figure is certain to be four or over. Libraries that fall short, generally do so because of obviously meager funds. Statistics show that it is easier to obtain a large per capita circulation in a small city than in a large one, and as New York obtains a figure of 2.64, a figure of 3 cannot be considered above normal.

In this attempt to figure the normal proportion of the various units of expenditure, a library, circulating 100,000 volumes a year, has been selected not only because 31% of the population of the United States is contained in cities of over 25,000 inhabitants, but also because such a use makes it possible to figure the number of books that will wear out. This cannot be done, accurately, with much smaller libraries. It is evident, for instance, that in a community of 500 persons, even novels, if lengthy ones such as "Alice-for-short," could never obtain sufficient readers to wear them out.

Now, in an average library for a city of 35,000 persons, there are some expenses so obviously unaffected by the fluctuations of its use, that business men will scarcely object to their being termed "fixed charges." After they have been segregated the problem will be simpler.

The first thing is the building. Whether it cost much or little, after it is once built it must be kept in repair, lighted and heated. And the cost of lighting and heating any building will be the same whether the persons who enter it in a day number 20 or 1,000. It is beyond question that if books are upon shelves in rooms to which visitors have access the minimum staff sufficient to police them must equal the number of rooms open to visitors. This minimum is the same whether the number of visitors in any one of the rooms is two or fifty. Further, the

working day for library employees being but about eight hours, if the rooms are open twelve hours a day, it is apparent that the minimum staff or police force must equal the number of rooms to be policed, multiplied by one and one-half. In practice, most libraries employ a force equal to double the number of rooms to be policed, and, during the three or four hours that the day and evening forces overlap, employ half the staff on such work, as they cannot do while "policing" or overseeing the rooms in their charge—such work as cataloging, ordering, correspondence, sending of notices, etc., etc.

The number of rooms in a building will control the number required to police it. The single rectangle, the cheapest form to oversee, is not suitable for anything but a branch, as a circulation of 100,000 volumes a year means an average daily number of visitors of between 300 and 400, and their moving about, charging, selecting and returning books makes sufficient noise to be inimical to serious study; hence this supposititious library must have a reference room. Children make more noise than adults, and more conversation between them and attendants is necessary than between the latter and adults. A corner partitioned off is only a makeshift, hence unless an admitted makeshift is accepted there must be added to the library a children's room. That makes three rooms (lunch rooms, staff rooms, closed stacks, etc., being eliminated from this part of the discussion, as they are not open to the public). That there are libraries doing good work with less than three rooms merely proves that with obviously inadequate facilities some executives are able to produce good results; it does not prove that inadequate facilities are adequate. Multiply, then, these three rooms by two, and six is the minimum number of the staff to oversee them. Add to this a janitor, and, though the staff is increased to seven persons, the library cannot be run satisfactorily unless the children's room is closed in the evening. Half of the staff is three, and if one is in the reference room, and one in the children's room, there will be

but one in the delivery desk to receive all books returned, to charge all books issued, to shelve as many books as possible, also to receive applications, issue reader's cards and run back and forth to the stacks to procure books called for, but not on the open shelves. Stated in this way, few city councils, or boards composed of business men, would object to a staff of seven being considered as a "fixed charge," largely irrespective of circulation attained.

What would it cost? That the greatest diversity in salaries exists was shown by the table submitted by Mr. Craver, of Pittsburgh, at the meeting at Pasadena in 1911. The average salary cost per 100,000 volumes issued, figured from Dr. Bostwick's list of 110 libraries circulating that number, or over, annually, is \$6,148. Roughly, I estimate that a competent librarian administering a library circulating 100,000 volumes annually, receives \$1,800 to \$2,000 if a man, and \$1,200 to \$1,500 if a woman. Which is selected depends largely on the personal preferences of the trustees, and the phases of work they desire accentuated; but as a woman, if she does equal work, should receive equal pay, let us take the figure \$1,800.¹ Of the five assistants, one at least, for the sake of the catalog, should be a graduate of a library school. Library school graduates, even when they live at home, are hard to hold at less than \$50 a month,² and the reference librarian, preferably a college graduate, should certainly not receive

1. Actually, this salary is somewhat above the average, there being more women employed as librarians than men.

2. This refers to graduates of library schools, having a one year's course. The entrance requirement of such schools is generally a high school education or its equivalent. Graduates of schools which demand an A. B. as entrance requirement, and whose courses cover two or three years, could not be secured at this salary. Most of such graduates become either chief librarians or heads of departments in the large libraries.

3. Most of the assistants in libraries in small towns live at home, hence are willing to work for less than those in larger cities, who are frequently "adrift." With the ethics of thus making the parents of library assistants contribute to the maintenance of the library by giving to their daughters the difference between what they earn and what it costs them to live, this paper has nothing to do. Thirty-five dollars a month works out at \$8.07 a week.

less. The other three could—I do not say should—be retained at \$35³ a month each; a janitor rarely receives less than \$50. These salaries total \$4,860. Owing to the difficulty of tiding over the supper hour, and the heavy work on Saturdays, some substitute work is generally necessary—say, \$25 a month—and the salary total is increased to \$5,160, of which 66 2/3 per cent to 90 per cent, according to how it is figured, is for policing the building, and janitor service.

Building maintenance is difficult to discuss. There are little data from which to figure it, and the sum of \$300 is suggested at hazard.

Lighting and heating costs depend on the design of the building. Given plans, and with knowledge of the prevailing climatic conditions, an engineer could lay out the wire and flue plans of any building so as to insure its being lighted and heated in the most economical manner. He could even estimate the annual cost, and sometimes the results would not differ much from his estimates. Practically, buildings are operated a full year, and thereafter the total expenditures for these items considered an annual charge. The reports of some 15 to 20 libraries in New York and Pennsylvania, each circulating 75,000 to 150,000 volumes annually, show an annual average expenditure for light and heat of \$817. Some receive light, and some heat, free, so, if the library has to pay, a safe estimate would be \$1,000.

The real significance of the items so far discussed is not their amount, but the fact that they are to all intents and purposes “fixed charges”—charges that cannot be reduced without obviously making it impossible for the library to render that service which the community is justified in expecting of it. Presented in this light, any board composed of business men, would accept them as such, and hold they were neither to any great extent susceptible of criticism, nor affected, except in a small degree, by the number of persons using the library.

3. See Note 3 on p. 8.

Still further, the fact that these items which must be regarded as "fixed charges," total \$6,460, renders the time-worn question of trustees, "What percentage of a library's income should be spent on books?" meaningless, unless, and here is the crux of the matter, the amount required to keep the book stock up-to-date can be demonstrated in a businesslike way, and then added to the fixed charges. This is self-evident, for if a library, with three rooms, receives only \$6,000, its receipts would be insufficient to light, heat and police it properly.

If we assent to the proposition that a per capita circulation of a certain figure must be attained or the library considered inefficient, and assume that the library has a fair stock of books to commence with, the sum that should be spent on books is really easier to figure than the salary item. The factors that enter into it are less variable. How does a merchant figure the selling price of his goods? He takes the purchase cost, and adds to it the cost of handling and his profit. Libraries do not want a profit, and the handling cost is practically *nil* because the number of persons who are necessary to police a building is almost sufficient to deliver, receive and do whatever other handling of books is necessary. If a book is of a kind that circulates steadily till it is worn out, its cost is the price paid for it, plus the amount spent to rebind it, if necessary; and the cost of each issue is the sum of its purchase and rebinding price, divided by the issues obtained. While it is true that some books cost \$10 and some 18 cents, and that numbers of books never wear out, it is also true that 75 per cent to 80 per cent of a library's circulation is obtained from books that circulate with fair regularity until they are worn out. Juvenile books constitute from 30 per cent to 60 per cent of a library's total circulation, the exact figures apparently depending on whether or not duplicate school collections are established; and fiction constitutes from 50 per cent to 75 per cent of the adult issues.

Take fiction first. Its price varies from De Morgan

at \$1.58 to the Duchess at 36 cents; but as almost all of it circulates to the worn-out point, it is possible, unless purchases, as judged by quality, are very erratic, to strike an average. And the same can be done with juvenile books. For fourteen months the James V. Brown library of Williamsport kept careful record of every book that was actually withdrawn as wornout. This method avoided the errors that are always due when "examples" are selected. There were 486 volumes of fiction discarded; their purchase cost was \$352.96, their rebinding cost \$231, and the number of issues obtained from them was 51,813, an average of 107. Therefore, the purchase and binding cost for each issue of fiction was 1.13 cents. During the same time 744 juvenile books were discarded for which \$494.51 had been paid originally, plus \$334.40 for rebinding. The total issues obtained were 67,068, an average of 90. Therefore, the purchase and binding cost for each juvenile issue was 1.24 cents. Some libraries may purchase cheaper or obtain a greater number of issues, but the difference is not likely to be very great. The James V. Brown library had only been operating four years, when the test was made, an insufficient time to bring many of the "circulation record-breakers" to the worn-out point. Later records show that some books were issued over 200 times before being worn out, and some years later a similar investigation might show an average issue of 125 for fiction instead of 107.

The significance of the figures is this, that if during any year a library spends for juvenile books and fiction less than the purchase and binding cost of an issue of these classes, multiplied by the total volumes circulated, its stock has depreciated in value. To a business man it would appear as false policy as diminishing his capital by declaring dividends out of it. That this is not generally recognized is proven by many reports showing extremely low costs of circulation. These apparent low costs of circulation are obtained by the bulk of the cost being

taken from capital (that is, the potential circulation inherent in the books). If a library, started with 10,000 volumes circulated those volumes till they were worn out, but never bought new ones, it could not be said the cost was merely that of administration—the cost would have been administration plus the capital (in this case, books) that was completely wiped out. Looked at in this way, the book and binding cost necessary to keep that portion of a library's stock from which nearly 80 per cent of its circulation is obtained, can be calculated. Figured for a supposititious 100,000 volumes circulation annually:

50,000 juvenile issues, at 1.24 cents...\$620

30,000 fiction issues, at 1.13 cents.... 339

To this must be added—and here it is necessary to estimate—the number of volumes destroyed by the health board on account of their having been in houses in which there were contagious diseases, and the number of such a nature as not to circulate to the worn-out stage—say, in a year, 50 volumes each of juvenile and fiction, \$118.50—and the total cost of fiction and juvenile issues is \$1,077.50.

Now, classed books—that is, books other than novels. Their cost cannot be figured on the same basis. Most of them never wear out. The turnover of the James V. Brown library's adult circulating class books is about 2. Mr. Ranck, of Grand Rapids, says, in a recent report, 20 per cent of his classed books did not circulate once in two years, and that his 4,000 "useful arts" circulation was obtained from about 2,000 volumes. If a book circulates but twice a year it will take 50 years to wear it out. How many of the technological books printed today will be sufficiently up-to-date in fifty years to be called for? Recent statements of prominent librarians show the average class book costs somewhat less than \$1.50. In 1911, however, the 382 adult circulating class books purchased by the James V. Brown library cost an average of \$1.88. In any event, it is not probable that the purchase cost (and rebinding cost of such as need it) would be less than \$2

a volume. If a library adds 500 circulating class volumes a year, including replacements of things like Longfellow, cook-books, handy manuals, U. S. histories, Stoddard's Lectures, etc., that would be \$1,000. Reference books, including trade and bibliographic manuals, can hardly be kept under \$200; so for books the minimum total is \$2,-277.50.

Magazines are as difficult to estimate on as class books; that is, magazines used for reading and reference, not for circulation purposes. The average expenditure for magazines per 100,000 circulation for the 110 libraries listed by Dr. Bostwick is \$240. The James V. Brown library finds that it costs to bind its magazines, including eight or ten presented (specifying the best binding), 75 per cent of their subscription cost; 75 per cent of \$240 is \$180, so the magazine cost is \$420.

The items determined so far are: Building maintenance, light and heat, salaries, books and binding, magazines and binding. The other necessary expenditures are supplies and printing, and miscellaneous.

Supplies and printing should include a monthly bulletin of additions to the library and an annual report, as well as all desk supplies, accession books, catalog cards, stamps, readers' cards, labels, book plates, book pockets, postal cards, etc. If one or two reading lists, and reading lists are of immense value, are issued, this item will cost about \$500.

Miscellaneous expenses will include freightage, drayage, expressage, traveling expenses, telephone rent, ice, extra scrubbing and cleaning (though possibly this should be charged against "salaries"), hauling away of ashes, repair of clocks, membership dues to whatever bodies the library as a library belongs, etc., etc., and will probably total another \$500.

The total budget is, therefore:—

Building maintenance	\$ 300.00
Light and heat.....	1,000.00
Salaries	5,160.00
Books and binding	2,277.50
Magazines and binding	420.00
Supplies and printing.....	500.00
Miscellaneous expenses	500.00
Total	\$10,157.50

and such a budget insures to the library an annual growth of about 400 circulating class books, \$200 worth of reference books, 100 to 150 volumes of bound magazines, government and state documents, whatever gifts are received, and that small proportion of the fiction purchased which "slows up" in circulation on account of not possessing universal appeal. This growth is probably sufficient, if, but only if, the library has a sound and numerically sufficient collection when it opens.¹ What that is, is difficult to demonstrate. One volume per capita is the suggestion that has been more widely accepted than any other.

These figures are only suggested as a basis for the minimum for an average community under normal conditions. Roughly speaking, the cost per 100,000 circulation does not increase as the circulation goes above that figure; New York's is considerably below \$12,000. An increase in circulation, up to a certain point, entails only an increase in the desk grade of library workers. It is probable that four additional assistants could care for the extra desk work involved in a 100,000 volume increase of circulation. Light and heat would not increase, but book purchase, binding and supplies costs, would double. Proportional

1. A frequent trouble with small libraries is that their patrons "read them through." No patron reads all the books in the library, but many frequently do read all the books on the subjects in which they are interested. Unless the original collection is a fairly large one, the annual growth, above suggested, will not be sufficient to hold the patronage secured at the start. For eight or ten years at least the annual expenditures for books would have to be considerably greater.

figures would probably hold good down to, say, 50,000 circulation—not much below.

If the suggested figures are practical ones, not merely theoretical, they should not differ greatly from the average of those of the libraries that are recognized as doing good, adequate work. In the 107 libraries circulating 100,000 volumes or over, tabulated by Dr. Bostwick, the expenditures of which were reported in detail by the U. S. Bureau of Education, the average expenditure per 100,000 volumes circulated was, in 1908:

Salaries	\$ 6,148	
Books	2,366	
Periodicals	240	
Bindery	593	
All other expenses.....	2,943	
		<hr/>
Total	\$12,290	..

That is, \$2,132.50 more than the estimate figured as above. The salary item is \$988 in excess; the books, binding and magazines \$501.50 in excess, leaving the remaining excess of \$643 divided among the other items. Probably most of these libraries have study rooms, art rooms and properly salaried members of the staff in charge of reference, technical and school work, which is as it should be. But why should not libraries separate their reference room salaries, and other units if possible, from the general salaries? If they stated in their printed reports that their reference departments cost so much for books, so much for magazines and binding, so much for salaries, etc., and then did the same with any other special departments, the cost of circulating a volume, as figured by adverse newspaper critics, would soon come down.

Three other activities are frequently engaged in by libraries, the wisdom of their doing such work being dependent upon local conditions. If they are undertaken, their cost should be added to the budget.

The first two are public lectures and art exhibitions.

Personally, the writer has little doubt that in almost all cases both are justified, and that in the majority of instances they may even be regarded as necessary. They should both be absolutely free to the public. To make even a nominal charge for them is of as doubtful policy as the "duplicate pay collection" of recently published fiction. Such charges, in the long run, inevitably make the poorer element realize that certain privileges are obtained from the library by those possessing money, which are denied to them whose incomes are but equivalent to the necessities of life. The cost that exhibitions and lectures entail on the library seem in most cases to be returned, not only through their value as advertising, but through their powerful stimulation of a demand for classed books.¹

The third activity is the circulation of current magazines. If magazines are given to the library for this purpose, or if the advertising obtained from such circulation is equivalent to the cost, little can be said against it. But if they have to be purchased it is incontestably the most expensive work in which an ordinary library can indulge. An investigation made some years ago by the Misses Sanderson and Smith of the New York state library school² and one made more recently by the writer, both show that single numbers of magazines, even those containing serials destined later to become best sellers, do not remain in demand more than four or five months, during which time they are issued 15 to 20 times. The more serious magazines, like the "North American Review" and the "Review of Reviews," are apparently issued but 5 to 10

1. A course of six lectures, by members of the better University Extension societies, costs generally between \$200 and \$300. An art exhibition, when the canvases are for sale, costs little more than insurance, expressage and printing. If the library is in touch with the larger art institutions, and not more than 200 or 300 miles distant from them, a really good three weeks' show could be given for between \$50 and \$100. Both a lecture course and art exhibition could therefore be had for about \$300.

2. Published in the *Library Journal*, vol. 33, pp. 86-94, March, 1908.

times. If the 15-cent magazines can be purchased for 10 cents, and are borrowed 15 times, the cost per issue is but $2/3$ ds of a cent. That is, it is true, but little more expensive than the cheaper fiction of the type of "The Duchess" and the Wister translations, which, purchased for 36 cents and rebound for 45 cents, if issued 125 times, cost per issue 56/100ths of a cent. But if it is a question of the "Century," or "Scribner's," which cannot be purchased under about 30 cents, evidently the cost per issue rises to 2 cents; and if it is the "North American Review," which costs about the same, and is issued but 5 times, the cost per issue rises to 6 cents, and if it is necessary to reinforce the magazine, and it generally is, the cost rises higher still. This is, of course, presuming that the library does not circulate the copies intended to be bound. Such a practice would be at least a risky proceeding, would cripple the reference department, and destroy the practice of persons coming to the library confident of being able to consult current magazines.

It is possibly worth adding that if the majority of readers borrow magazines for the serials only, the case looks still worse. In the first place, eight numbers of the "Century" (each serial runs about eight months), cost \$2.40, as against \$1.08 for the novel in book form; in the second place, each issue of each number costs 2 cents, as against a little over 1 cent for the novel in book form; and in the third place, if the magazines are borrowed solely for the serial it costs the library 16 cents (eight issues at 2 cents), to enable the borrower to read it as issued, instead of the trifle over 1 cent it would cost to supply him with the same story in book form a little later.

To return to the general budget, the chief points to be borne in mind are:

1. That a library should be expected by every municipality to do work proportioned to the population.
2. That given the population, it is practical to figure normal costs of administration.

3. That to all intents and purposes the charges of maintenance of building, light, heat, and probably over 80 per cent of salaries, are as much fixed charges as the payment of interest on mortgages negotiated by a railroad.

4. That the acceptance of the classification of the expenditures for the maintenance of building, light, heat and the larger portion of the salary item as fixed charges leaves little but the cost of books, binding, and magazines to be figured on: further, that the cost of these latter items can be figured with reasonable accuracy in an ordinary circulating library, possessing a fair collection to start with, and not expected to build up special collections or to engage in unusual and costly work.

ATLANTA, GA.

025.11

T484N

Thomson, O.R.H.

A normal library budget and
its units of expense.

**PLEASE DO NOT REMOVE
CARDS OR SLIPS FROM THIS POCKET**

**UNIVERSITY OF TORONTO
FACULTY OF LIBRARY SCIENCE**

